REMARKS

[001] The Office Action cites the following art: U.S. Patent Number 6,397,207 to Bleizeffer et al (hereinafter Bleizeffer), U.S. Published Patent Application Number 2004/0003004 to Chaudhuri et al (hereinafter Chaudhuri), and U.S. Patent Number 5,960,428 to Lindsay et al (hereinafter Lindsay).

[002] Claims 1-19 are pending. Claims 1, 8, and 14 are independent claims. Claims 1-5, 8-11, and 14-17 are rejected under 35 USC §103(a) as unpatentable in view of Bleizeffer in combination with the Chaudhuri. Claims 6, 7, 12, 13, 18, and 19 are rejected under 35 USC §103(a) as unpatentable in view of Bleizeffer in combination with Chaudhuri and Lindsay.

[003] Applicants have amended the specification to resolve a few typographical errors. Applicants have amended Claims 1-8, 10, 11, 14, and 16-18. No claims have been canceled. No new claims have been added. No new subject matter has been added. Applicants submit that the following amendments and remarks place the pending claims in condition for allowance.

AMENDMENT OF CLAIMS 1-8, 10, 11, 14, AND 16-18

[004] The Applicants have amended Claims 1-8, 10, 11, 14, and 16-18 to clarify the novel aspects of the invention. The amendments will be described in relation to the rejections pertaining to the amended Claims.

REJECTION OF CLAIMS 1-5, 8-11 AND 14-17 UNDER 35 USC § 103(a)

[005] Claims 1-5, 8-11, and 14-17 are rejected under 35 USC §103(a) in view of Bleizeffer and Chaudhuri. Applicants traverse this rejection. Applicants submit that Claim 1 is representative of the subject matter recited in independent Claims 8 and 14. Therefore, Applicants response will focus on Claim 1 with the understanding that responses for Claims 8 and 14 would follow a similar vein.

[006] To establish a *prima facie* case of obviousness, three criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim

limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. MPEP §2143. Applicants submit that no *prima facie* case of obviousness exists because Bleizeffer and Chaudhuri fail to teach all the claim limitations, lack a suggestion or motivation to make the combination, and provide no reasonable expectation of success.

[007] Claim 1 as amended recites:

~~For a database management system to be operatively coupled to a data processing system, a~~ A computer-implemented method for optimizing compression of a workload comprising a plurality of queries, the computer-implemented method comprising:

estimating a cost to execute ~~the~~ **each query** within a plurality of queries of a **workload**;

selecting a sub-set of queries from the workload according to a threshold level, the threshold level being a function of the **total** estimated cost to execute the **all** queries of the **workload**; and

compressing the selected sub-set of queries. (Emphasis added.)

[008] Applicants submit that Bleizeffer and Chaudhuri fail to teach or suggest estimating execution cost for each query of a workload or selecting a sub-set based on a threshold level. Furthermore, Applicants submit that Bleizeffer and Chaudhuri can not be combined as suggested without frustrating the purposes of one or both references. Therefore, Bleizeffer and Chaudhuri lack a motivation to combine these references to arrive at the claimed invention.

Teachings of the references

[009] Bleizeffer teaches generally a user interface for producing customized reports and different views of explain data for user selected queries. Bleizeffer Col. 3, ll. 1-22. Bleizeffer is concerned with making it easier for a user to review and analyze execution cost information for one or more SQL queries. Bleizeffer Col. 2, ll. 34-39. The execution cost information is contained within "query explain data." Bleizeffer Col. 2, ll. 1-25. Bleizeffer explains in great detail various components of a user interface which allows a user to review and generate reports on explain data and subsets of explain data. Bleizeffer Col. 6, ll. 34-48, Fig. 3.

[010] Chaudhuri teaches an incremental DB tuning tool, that builds result sets on each iteration, and then uses the result of the last iteration to affect the tuning recommendation resulting from the next iteration. Chaudhuri Para. 7. Chaudhuri addresses the problem of a DB tuning tool in which workload compression execution time is unpredictable and it is desirable that workload compression complete within a known time period. Chaudhuri last sentence Para. 3, Para. 7. Chaudhuri laments the faults of tuning algorithms for index selection that examine each query in the workload. Chaudhuri Para. 5 and 6.

[011] Chaudhuri teaches rather than tune a database using the whole workload at once, tune the database incrementally during time slices within a time window. Chaudhuri Para. 8. In fact, Chaudhuri teaches that this is a fundamental concept of his invention. Chaudhuri states "A key issue in time-bound tuning is that the above three modules cannot be invoked in sequence on the **entire workload**. This is because (a) the time taken to simply parse all queries in the workload may exceed the total time-bound..." (emphasis added). Chaudhuri Para. 31. Chaudhuri teaches DB tuning that includes a step of compressing SQL queries. Chaudhuri parse and compress module 232 in Para. 35.

[012] Lindsay teaches efficiently processing star/join queries by using a filtered fact table. Lindsay Abstract. Lindsay further teaches identification of suitable queries for use in Lindsay and preparation of a query plan. Lindsay Col. 2, ll. 45-60.

Elements recited in the Claims

[013] The present invention balances the cost of analyzing and performing compression of a SQL query workload against the overall cost of executing the queries of the workload without compression. The present invention ensures that the cost of analyzing and performing the compression does not outweigh the benefits of performing the compression. See Applicants filed Specification (hereinafter "Specification") page 2, ll. 9-12, page 4, ll. 7-26. The problem is that the workloads may contain queries for which compression yields minimal benefit, such a low benefit that the cost of compression outweighs the benefit. Rather than compressing each query of the workload, the present invention uses a threshold that is a function of the estimated cost to execute all the queries to quickly identify and compress only a sub-set of queries in the workload. Specification page 6, line 12 – page 7, line 4. Compressing the subset of queries

provides the maximum benefits of compression balanced against the costs of analyzing and performing the compression in relation to the execution costs for the queries of the workload.

[014] Applicants have amended the claims to clarify these features of the present invention. In particular, Claim 1 is amended to recite that the cost estimation is performed on **each query** of a **workload**. Support for this amendment is found in the Specification on page 6, ll. 12-22. Applicants submit that Bleizeffer fails to teach "estimating a cost to execute **each query** of a plurality of queries of **a workload**." Bleizeffer is silent on the concept of workloads. Bleizeffer is concerned with reporting of explain data associated with particular queries, selected by a user. Bleizeffer Col. 8, ll. 30-40, Fig. 7. There is no teaching or concept of a group of queries that form a workload.

[015] Chaudhuri teaches workloads however, Chaudhuri teaches estimation of execution costs for queries selected during a time slice within a time window (time-bound), not each query of a workload. Chaudhuri teaches "To implement time-bound tuning, the time-bound tuner partitions the total time-bound into small time slices, or portions, and invokes the above three modules in three phases within each time slice." Chaudhuri Para. 31. The phases of the time slices are allocated 20% to query parsing, 40% to candidate selection and 40% to enumeration. Consequently, Chaudhuri teaches away from parsing each query of a workload and from estimating an execution cost for each query of a workload. Chaudhuri Para. 31. Instead, Chaudhuri teaches that only a portion of the queries are parsed and analyzed at a time. Chaudhuri Para. 31. To analyze or parse each query of the workload, would frustrate the purposes of Chaudhuri in completing a portion of the analysis and parsing incrementally within a time-bound.

[016] Applicants submit that Bleizeffer fails to teach or disclose estimating of execution costs for each query in a workload because Bleizeffer fails to teach workloads. Chaudhuri teaches workloads but teaches away from the claimed limitation that execution costs are estimated for "**each query** of a plurality of queries of **a workload**." See Chaudhuri Para. 31. Therefore, neither Bleizeffer nor Chaudhuri teach the estimating limitation of Claim 1.

[017] Claim 1 recites "selecting a sub-set of queries from the workload according to a threshold level, the threshold level being a function of the **total** estimated cost to execute **all** the queries of the **workload**." The Office Action suggests that this concept is taught in Bleizeffer

where Bleizeffer teaches "a query with higher-than-average statement cost might alert a user to inefficiencies in the access path." Applicants disagree. Bleizeffer is teaching alerting a user, not selection of a sub-set of queries.

[018] "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). *MPEP* §2143.03. Accordingly, Applicants submit that Bleizeffer fails to teach this limitation because "alerting" and "selecting" are two very different actions. Applicants note that Bleizeffer only alerts because Bleizeffer is limited to a user interface. Bleizeffer includes not suggestions that a sub-set of queries are selected, in particular being selected by a computer-program product automatically. Due to potential confusion between actions performed by a user and computer implemented method, Applicants amended Claims 1-7 to clarify that the actions are performed by a "computer-implemented method" rather than a user, as in Bleizeffer.

[019] Similarly, Claim 1 was amended to clarify that the threshold level relates to the total estimated execution cost of all the queries in the workload. Specification page 5, ll. 18-21, 25-28, page 6, ll. 12-22. Specifically, Page 6, ll. 4-11 explains that the threshold is directly related to total execution cost for all of the queries of the **workload**. As described above, Bleizeffer lacks teachings regarding workloads. Chaudhuri teaches workloads but teaches against estimating the cost of executing all queries in a workload. Therefore, Applicants submit that Bleizeffer and Chaudhuri fail to teach or disclose "selecting a sub-set of queries from the workload according to a threshold level, the threshold level being a function of the **total** estimated cost to execute **all** the queries of the **workload**."

REJECTION OF CLAIMS 6, 7, 12, 13, 18 AND 19 UNDER 35 USC § 103(a)

[020] Claims 6, 7, 12, 13, 18, and 19 are rejected under 35 USC §103(a) as unpatentable in view of Bleizeffer in combination with Chaudhuri and Lindsay. Applicants traverse this rejection. Claims 6, 7, 12, 13, 18, and 19 depend respectively from independent Claims 1, 8 and 14. If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) MPEP §2143.03 Therefore, Claims 6, 7, 12, 13, 18, and 19 are allowable for at least the same reasons as independent Claims 1, 8 and 14.

[021] Furthermore, Applicants submit that Claims 6, 7, 12, 13, 18, and 19 include limitations not found in the prior art of record. For example, amended Claim 6 recites "wherein ~~the step of~~ selecting further ~~comprising~~ comprises sub-dividing the plurality of queries into groups of queries based upon query types wherein the threshold applied to a group of queries is a percentage of a total estimated cost of execution for the group of queries." The Office Action suggests that this element is taught in Lindsay at Col. 2, lines 45-60. Applicants disagree.

[022] Lindsay teaches generally efficient processing of star/join queries by using a filtered fact table. Lindsay Abstract. Lindsay further teaches identification of suitable queries for use in Lindsay and preparation of a query plan. Lindsay Col. 2, ll. 45-60. The query plan referred to is the same query plan taught in Bleizeffer, a plan for how the query will be executed. Applicants fail to see any teaching in Lindsay of the concept of sub-dividing a set of queries into groups based on query type. The term "type" is mentioned in Col. 2, ll. 45-60 however not in the context of one query distinguished from another query based on type. Furthermore, there is no teaching in Lindsay that the threshold applied to each group relates to the total execution cost for the group, those queries of a particular type. Consequently, Applicants fail to see how Lindsay teaches "selecting further comprises sub-dividing the plurality of queries into groups of queries based upon query types wherein the threshold applied to a group of queries is a percentage of a total estimated cost of execution for the group of queries." Applicants submit that Lindsay fails to teach this element because all the words of Claim 6 have not been considered or given proper weight. Therefore, Claim 6 is not obvious in view of the prior art.

[023] Applicants submit that Claims 7, 12, 13, 18, and 19 are also nonobvious. However for sake of brevity, Applicants desire to focus instead on the allowability of these claims based on the allowance of the independents upon which they rely.

REJECTION OF CLAIMS 1-19 UNDER 35 USC § 103(a)

[024] Finally, even if all the claim limitations are taught or suggested, there must be some suggestion or motivation to combine reference teachings. *See* MPEP § 2142. This suggestion or motivation to combine references must be established by factual findings. "The factual inquiry whether to combine references must be thorough and searching. (quoting

McGinley v. Franklin Sports, Inc. 262 F.3d 1339, 1351-52, 60 USPQ2d 1001, 1008 (Fed. Cir. 2001)).

[025] Furthermore, Applicants submit that Bleizeffer and Chaudhuri can not be combined as suggested without frustrating the purposes of one or both references. Applicants submit that any motivation Bleizeffer and Chaudhuri may provide is negated by the stark difference between the two inventions. Bleizeffer is a user interface for generating reports. Chaudhuri is a query tuning tool designed to operate during specific time windows and process multiple time slices. Applicants submit that the delay imposed as a user reviews a set of queries and determines which ones to generate reports on would make it extremely difficult, if not impossible for Chaudhuri to execute its tuning analysis during a particular time window. Furthermore, Chaudhuri is designed to operate automatically during periods of low activity such as late evening, early, morning, weekends, or holidays. These are times in which a query analyst user that may use Bleizeffer is unlikely to be available. Consequently, there is no motivation to combine Bleizeffer and Chaudhuri.

[026] In addition, "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. The degree of teaching away will of course depend on the particular facts; in general, a reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant." *United States v. Adams*, 383 U.S. 39, 52, 148 USPQ 479, 484 (1966).

[027] Here, Chaudhuri teaches against parsing or analyzing each query in the workload. "A key issue in time-bound tuning is that the above three modules cannot be invoked in sequence on the **entire workload**. This is because (a) the time taken to simply parse all queries in the workload may exceed the total time-bound..." (emphasis added). Chaudhuri Para. 31. Such a teaching motivates one skilled in the art to parse or analyze queries of a workload that may be used in tuning or in query compression on a partial basis. In contrast, amended Claim 1 clearly indicates that an estimate of cost is performed for each query of the workload. This directly contradicts the teaching of Chaudhuri. Therefore, Chaudhuri can not provide a motivation to practice the claimed invention.

[028] Finally, Applicants assert that because the Office Action has not provided evidence of teachings or suggestions of estimating execution cost for each query of a workload or selecting a sub-set based on a threshold level, the Office Action has also failed to provide evidence why one of skill in the art would select the prior art references or combine them. Therefore, this further supports Applicant's assertion that these claims are allowable under 35 U.S.C. §103(a) over the prior art of record.

CONCLUSION

[029] In view of the foregoing, Applicants submit that the application is in condition for allowance. In the event any questions or issues remain that can be resolved with a phone call, Applicants respectfully request that the Examiner initiate a telephone conference with the undersigned.

Respectfully submitted,

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